2020-09-11

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Margraf, J

10.1080/0167482x.2020.1816959
Journal of Psychosomatic Obstetrics & Gynecology
Informa UK Limited

Running head: FERTILITY DESIRE

Mental health and the wish to have a child: A longitudinal, cross-cultural comparison between Germany and China

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Acknowledgments

This study was supported by Alexander von Humboldt Professorship awarded to Jürgen Margraf by the Alexander von Humboldt-Foundation. We appreciate the contribution of the participants in this study, as well as Dan Cai, Jie Cai, Shan Lu, Zhihua Gao, and Zhiqin Sang-for their assistance in data collection and management.

Disclosure

Dr. Margraf, Dr. Lavallee, Dr. Zhang, Dr. Woike, and Dr. Schneider have nothing to disclose.

Abstract

Background: The desire to have children has been declining globally, especially in industrialized nations. This study examines the physical health correlates, and positive and negative mental health correlates of the wish to have a child across time and in two countries.

Method: Questionnaire data were obtained from large-scale university samples of 12,574 participants in Germany and China.

Results: The wish to have a child (child wish) is related to positive and negative mental health in China and, to a lesser degree, in Germany. Child wish is positively related to some aspects of mental and somatic health for Chinese women and men, negatively to depression for Chinese and German men and Chinese women, and positively to stress for German men, with generally small effects. Effects hold when controlling for age, partnership status, and family affluence. Most relationships were almost equal between women and men (in both China and Germany), and between countries with the exception of two differing paths in each gender group. That is, having a partner is associated with a higher child wish in both Chinese and German female students. In China, older female students are more likely to want to have a child, while older female students in Germany are less likely to want to have a child. Neither partnership nor age predict child wish for the next year.

Conclusion. In sum, Chinese students reported feeling more positively about having children when they were happy and healthy, with the exception that highly satisfied Chinese males report lower child wish in the next year. More depressed Chinese and German men and Chinese women reported lowered child wish, and stressed German men reported more child wish. Older students reported more (Chinese) or less (German) child wish depending on country.

Keywords: chid wish, somatic health, positive mental health, negative mental-health, cross-cultural, longitudinal, depression, stress

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Although having children can result in partnership and personal stress, especially in the first years after childbirth, and until children leave the house, having children is simultaneously associated with increased longevity, especially as parents progress into old age (1). Further, raising children often gives parents a sense of meaning and purpose, and is positively associated with eudaimonia. The unfulfilled wish to have a child can certainly be among the most painful of life's challenges for infertile couples and can bring on deep depression and anxiety equivalent to the emotional pain experienced by women with cancer and HIV (2). Even among women who undergo fertility treatments and succeed in having a child, a sustained wish to have a child after treatment is associated with worse mental health outcomes than the satisfaction of that wish (3). At the same time, the wish to refrain from having children has risen with the changing economic landscape, as children shift historically from being economic assets (i.e., providing family labor) to liabilities (now posing a greater cost burden) and women gain ground in the workplace and access to birth control. Little is known about how mental and physical health factor into the wishes of today's young adults to eventually have children versus to remain without children.

Parenthood and health

Research on the effects of having children on well-being generally supports the view that parenthood has positive effects, or benefits, in some domains, and negative effects, or costs, in others. One study of over 2000 U.S. adults indicated that parents with young children living at home tend to have lower levels of affective well-being and satisfaction but a greater sense of meaning and purpose than non-parents (4). A more recent review across studies indicated that having children in early adulthood is related to greater stress and lower well-being, largely due to marital strain and lower economic security (5), yet also to greater sense of purpose and meaning. While infertility can be a great source of psychological anguish,

adults in their 50's who are childless or "child-free" do not experience greater mental distress than those who have had children, and the negative attitudes toward the childless held by others are more of a source of distress than being childless itself (5). There are also positive effects of having at least one child on health outcomes, including reduced mortality. In one study of all of the residents of Sweden, 60-year-olds with a child lived an average of 2 years longer for men and 1.5 years longer for women than their same age peers without children, with the differences in death risk growing with increased age (1). A Danish twin study indicated that, when controlling for partnership status, having a first child was related to an increase in well-being in females aged 24-45. However, having additional children beyond the first resulted in a slight negative effect on well-being in females in this age group, dipping below the well-being of those with no children. In both men and women aged 50-70, ever having had a child did not have an effect on well-being (6). Regarding depression, specifically, a large-scale survey of over 13,000 U.S. adults indicated that across U.S. parents, all types of parent groups were more depressed than nonparents, with no significant differences between the sexes. Further, certain types of parenthood were associated with more depression (e.g., single parents) than other types (e.g., married parents) (7). Further, the effects of bringing children into the world on adults' well-being sit within cultural contexts unique to the societies in which people live. Particularly for men, having a young child in the home was associated with greater happiness in those societies where parenthood was valued more (e.g., the Eastern European countries in the study) rather than less (e.g., Netherlands, Flanders/Northern Belgium, Northern Ireland, Switzerland, Great Britain) (8). Finally, while research exists on the effects of having actual children on mental health, there is less research on whether the plan or desire to have children has any effect on mental health. Some initial findings with university students across cultures indicate that child wish is a positive predictor of future positive mental health and a negative predictor of future depression in Germany and China (9). In sum, both having children, and desiring children, are predictive of mental health

outcomes. However, little is known about how mental health predicts future fertility or adoption planning.

Predictors of childbearing

Across countries in the West, women generally expect to have between two and three children, yet actual family size data dips below these expectations and desires, with a mean number of children per woman between 1.5 and 2 (10). Data from population studies of fertility indicate societal trends toward postponement of the age at first childbirth (11) and global declines in overall fertility over the last several decades. These changes have coincided with the introduction of the birth control pill and increases in white collar jobs and education, and access to all of these by women since the 1960's. They have also coincided with increases in the cultural importance of personal agency and choice in lifestyle options (10, 12). Birth rates are at an all-time low in the U.S. (13), at approximately 1.8 children per woman (14). Both desired and actual fertility rates in Germany are among the lowest rates world-wide, with rates of childlessness among the highest globally, and fertility rates in the bottom 20 countries (15), though the German birthrate has risen slightly in recent years to an average of 1.59 births per woman in 2016 due to an increase in migrant populations with higher levels of fertility (16). In Asia, birthrates are hitting all-time lows. Chinese birthrates are at their lowest since the 1960's despite China easing their legally-mandated one-child-per-couple policy in 2014. Chinese women now have an average of 1.6 children (17).

Though fertility declines correspond with certain society-level changes, there is limited research on the predictors of the desire for children, whether through childbearing or adoption, and desired family size at the individual level. An important distinction can be made between the choice of "when" to have children (where childbearing or adoption or other means having children, such as surrogacy, etc. are viewed as part of a normal life course step) versus "whether" to have children (where childbearing or adoption are viewed as an optional lifestyle choice) (18). Research generally shows that the decision of whether to have

a child or more children is largely influenced by socioeconomic factors. However, personal mental and physical health has not been examined. In one study of West Germans in the late 1980's and early 1990's, desire for a larger family size was predicted by coming from a two parent household, having more siblings, and subscribing to Catholicism. Over the life-course, these factors (family of origin and religion) seem to become less important, as women mature and begin childbearing. Indeed, 50% of women stated a different number of desired children at the beginning and the end of the six year survey period in the West German panel data, highlighting the importance of assessing child wish over time (19). A Belgian study of the psychometric and factorial properties of a questionnaire assessing motivations for having or not having children identified several main categories of motivation, including fear of loss of autonomy, fear of loss of femininity, unpredictability, and overpopulation concerns as reasons for not wanting children, and biopsychosocial integration, parenting, getting a second chance at life, relational growth, and rejuvenation as reasons for wanting children (20). In another study on Germany's declining birth rates, many respondents who didn't have children expressed intentional, rather than unintentional infertility. Among women who didn't have children in this study, 61% of those in their 20's and 49% of those in their 30's expressed a wish to have a child. Among men without children in their 20's, 35% expressed a wish to have a child, and 49% of childless men in their 30's a wish for a child. Emotional reasons were given in favor of having children, and financial constraints were cited as the primary reason for not planning to have children (21). When asked to list factors in their decision to postpone fertility, women in Italy and Spain name changing norms, increased optimism about fertility, as well as economic and social factors as weighing into their decisions to postpone fertility (22). Women in Iran are more likely to express child wish when they are experience higher social support and are in stable marriages (23). In Poland, women who are reluctant to have children are influenced mainly by emotional factors, and men who do not have children are influenced by childrearing values and expectations of satisfaction. Both men and women

are also highly influenced to remain without children by perceptions about the difficulty involved in raising children (24). In Japanese university students, the desire to have children was associated with being in a romantic relationship and having sexual intercourse only in men, but not women (25). In a rare study of child wish in gay and lesbian couples, decision-making factors were characterized as sociodemographic, personal (especially with regard to sexual orientation factors), relational, and contextual (26). Surprisingly, while mental health can impact fertility itself, in that stress and depression are both outcomes of infertility and negatively impact the ability to conceive (27), we did not locate any research examining mental health factors and the desire to have children. This area of research is unexplored to our knowledge.

The present study

The purpose of the present study was to examine the relationship between mental health and child wish in a large, multi-national sample of university students in Germany and China, studied over time. The data are from the "Bochum Optimism and Mental Health (BOOM) Studies" (9, 28), which aim to enhance knowledge of the causes and consequences of positive mental health and mental health problems cross-culturally and over time. We investigated both positive and negative mental health predictors of child wish at two time points and across two countries: Germany and China. Child wish was hypothesized to be positively predicted by salutogenic factors, including somatic health, subjective happiness, positive mental health, and satisfaction with life. Child wish was hypothesized to be negatively predicted by pathogenic factors, including depression and stress (29, 30). There was no precedent for any prediction regarding differences in the pattern of relationships across men and women or across China and Germany, so these patterns were examined on an exploratory basis.

Method

Participants

Participants were all students at universities in Germany and China. In the present study, we only used data from participants with no existing child in baseline and follow up.

Germany. The analyzed German sample consisted of student participants recruited from Ruhr-University Bochum, Germany. In the German sample, 1,441 of a total of 1,719 respondents definitively had no existing child, and the rest may or may not have had a child already (i.e., answered "have child/children" or did not answer the question). Only the 1,441 respondents who definitely had no existing child were included in the present study. Of the 1,441 German students with no existing child, 1,257 students indicated that they wanted to have a child/children in the future. Students were assessed via online survey. German students were recruited by an e-mailed invitation with a link leading to an online questionnaire. The link was sent to all students enrolled at Ruhr-University Bochum. They were offered an incentive to take part in a drawing for a gift certificate or a tablet computer.

China. The analyzed Chinese sample consisted of 11,133 university students from five Chinese universities: the Capital Normal University Beijing, Guizhou Finance and Economics University, the Hebei United University, Nanjing University, and Shanghai Normal University. In the Chinese sample, 11,133 of a total of 12,057 responses to this question were from people who definitively had no existing child, and the rest may or may not have had a child already. Only the 11,133 respondents who definitively had no child were included in the present study. Of the 11,133 Chinese students with no existing child, 9,872 students indicated that they want to have a child/children in the future. Participants, mainly freshmen, were recruited during their first study month via an invitation by mail. Data were gathered via an online or a paper-pencil questionnaire, which were administered in a group testing session. Participants received 10 RenMinBi (approximately 1.30 euros) upon returning the questionnaire.

Procedure

Data for the present study were collected in the BOOM (Bochum Optimism and Mental Health) study, a large-scale, cross-cultural, longitudinal investigation of risk and protective factors in mental health (31, 32). The Ethics Committee of the Faculty of Psychology of the Ruhr-University Bochum, Germany, approved the original study on May 12, 2011 and renewed on October 2012. The approvals for the German site were communicated to the participating Chinese Universities who acknowledged these approvals. As the data were de-identified from the very beginning of data collection, no statement by an institutional board/ethics committee was required to collect data in China.

Measures

Child wish. The wish to have children ("*Kinderwunsch*" in German) was assessed using a single yes-no item ("Do you want to have a child/children in the future?") created for this study. Participants who already had a child, were asked "Do you want to have one more child / more children?". Answers were recoded into simple "no" or "yes" responses. No validity or reliability data are available.

Quality of health. Overall current quality of health was assessed using the EuroQol (EQ-VAS) (33-35). Participants rated current health status on a scale ranging from 0 (worst imaginable health) to 100 (best imaginable health). Validity of EQ-VAS was indicated by convergence with the five-dimensional version of the EuroQol (EuroQol 5D) with WHO-5 and known clinical groups across several countries.

Family affluence. To ensure sufficient comparability across vastly different countries, the Family Affluence Scale II (FAS II) (36) served as the main cross-cultural measure of socioeconomic circumstances. The FAS II is a four-item measure of family wealth, developed as part of the WHO Health Behavior in School-aged Children Study. The FAS score is calculated as the sum of responses to the following questions (with either 2 or 3 response alternatives): "Does your family own a car, van or truck?", "Do you have your own bedroom for yourself?", "During the past 12 months, how many times did you travel away on holiday

with your family?", and "How many computers does your family own?". Convergent validity was established via correlations with the Gross National Product across 35 countries (36). Cronbach's alphas at baseline were α=.32 (Germany), α=.64 (China). Alphas were in line with prior research on this short scale, and are not surprising given the differing, yet related domains assessed (37).

Positive mental health was assessed with a 9-item Positive Mental Health scale (P-Scale) developed by our research team for ongoing studies (38, 39). The scale assesses positive aspects of health and life experiences (e.g., "*I am often carefree and in good spirits", "I enjoy my life, I manage well to fulfill my needs", "I am in good physical and emotional condition").* Items are answered on a 4-point Likert scale ranging from 0 (*do not agree)* to 3 *(agree).* Research indicates that this scale is appropriate for cross-cultural research, based on analyses indicating full strong measurement invariance (i.e., all items are invariant; see analyses section for more explanation on measurement invariance) across cultures (38). Cronbach's alpha was α=0.91 both in Germany and in the Chinese student samples.

Life satisfaction. The Satisfaction with Life Scale (SWLS)(40) assessed global life satisfaction using five items (e.g., "In most ways, my life is close to my ideal"). Items were rated on a scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). Scores were averaged across items, with higher scores indicating higher life satisfaction. Research indicates that this scale is adequate for cross-cultural research, based on analyses demonstrating partial strong measurement invariance (i.e., some, but not all, items are invariant) across German, Russian, and Chinese samples (38). Internal consistency in the current sample was α = .87 in both Germany and China.

Subjective happiness. Subjective happiness was assessed using the four-item Subjective Happiness Scale (SHS) (41). Participants responded on a seven-point Likert scale with anchor point wording depending on the question. Responses were averaged for an overall score where high scores indicated high subjective happiness. Research demonstrated

that this scale is adequate for cross-cultural research, based on analyses showing full weak measurement invariance across German, Russian, and Chinese samples (38). Internal consistency in the current sample was α = .85 in Germany and α =.75 in China.

Depression, Anxiety and Stress

The 21-item short version of the Depression, Anxiety and Stress Scales (DASS-21) (42), appropriate for cross-cultural research (43), assessed symptoms of depression, anxiety and stress as outcome variables of daily stressors. Psychometric properties for the short version are comparable to the 42-item long version (44, 45). The DASS-21 is composed of three 7-item subscales for depressive, anxiety and stress symptoms over the past week. Items were rated on a 4-point Likert scale from 0 (*did not apply to me at all*) to 3 (*applied to me very much or most of the time*). Psychometric properties for the short version were shown to be similar to those for the long version, and the scale has been shown to be appropriate for cross-cultural research, with full weak measurement invariance between Chinese and German student samples (see Appendix A). More details of this analysis are beyond the scope of this paper, but available from the authors. In the present study, only the depression and stress components were analyzed to avoid multicollinearity since anxiety was highly correlated with stress in both the German sample (r=.60) and the Chinese sample (r=.73). The reliability of the subscale was $\alpha_{depression}$ =.89, α_{stress} =.85 in Germany; $\alpha_{depression}$ =.88, α_{stress} =.77 in China.

Basic sociodemographic predictors. Participants were asked to indicate sex (male or female), birthdate, from which age at the time of testing was calculated, and partnership status (has a partner, or does not have a partner), via self-report.

Data Analysis and Preparation

For statistical analysis, we used SPSS (version 24) (46). Internal consistency was computed with Cronbach's α coefficient. Cronbach's $\alpha > 0.70$ indicate acceptable, $\alpha > 0.80$ good, and $\alpha > 0.90$ excellent internal consistency (47). A series of path models were used to evaluate the relationship between child wish and mental health measures in baseline and

follow-up, controlling for age, education, and gender; one for male students and one for female students, in each country separately. Models were compared between gender groups, separately for Germany and China. We limited the number of predictors (to avoid overfitting the model) (48, 49). In the baseline model (M1), all paths were freely estimated in both gender groups. In the second model (M2), all paths were constrained to be equal between both gender groups. If M1 and M2 significantly differed, some paths were systematically set to be free, one by one, meaning these paths were, one by one, no longer constrained to be equal in both groups, according to modifications indices (higher value indicated larger differences), until the χ^2-difference test was no longer significant.

In cross-cultural psychological studies, measurement invariance should be assessed to ensure that the results of comparisons of constructs across different countries can be meaningfully interpreted. The first level of measurement invariance is configural invariance. A measure is said to have configural invariance when it has the same factor structure across countries. The second level of measurement invariance is weak invariance (full/partial). Full weak invariance means the strength of the relationship between each item and its underlying construct is the same for each country. Partial weak invariance holds when the strength of the relationship between some items and their underlying construct is the same for each of the countries measured. Regression coefficients across countries are comparable if the assessments are at least partial metric invariant (Vandenberg & Lance, 2000). The third level of measurement invariance is strong invariance (full/partial). Full strong invariance holds when the intercept, the strength of the relationship between each item and its underlying construct are the same for each country. Partial strong invariance holds when the intercept, the strength of the relationship between some items and their underlying construct are the same for each country. All the measures above satisfy at least full weak invariance between China and Germany. So, in the last step, we compared the path coefficients between countries separately for female and male students.

The path analyses were calculated in Mplus (version 7.4) using the weighted least squares mean and variance adjusted estimator (WLSMV) (50) and theta parameterization. Model fit indices were calculated to evaluate the goodness of fit for the path models. Because the Chi^2-test is sensitive to sample size, the root mean square error of approximation (RMSEA) (51) was also used for model evaluation. RMSEA values smaller than .05 indicate a good fit and values smaller than .08 a reasonable fit (52). A 90% confidence interval for RMSEA was also reported. For the comparative fit index (CFI) (53) values greater than .9 indicate a good fit. Model comparisons were conducted according to the Satorra-Bentler Chi^2 difference test in Mplus.

Results

Descriptive statistics and correlations

Descriptive statistics for each measure are presented in Table 1. Table 2 presents correlations among measures. Results indicated that in both cultures, child wish at both baseline and follow-up were negatively correlated with depression and stress, and positively correlated with quality of health, positive mental health, subjective happiness, and satisfaction with life at both baseline and follow-up.

Path models predicting child wish

Results from the path models with mental health variables predicting child wishes at baseline and follow-up controlling for age, partner (yes=1, no=0), and FASII are presented in Table 3a and Figure 1 for China and Table 3b as well as Figure 2 for Germany. In the Chinese student sample, FAS II had a significant negative effect on child wish at baseline in both female and male students. Having a partner at baseline and age were positively related to child wish at baseline, but only in female students. Quality of health and subjective happiness at baseline positively predicted child wish at baseline significantly in both female and male students. Satisfaction with life at baseline significantly and positively predicted child wish at baseline in female students. Depression at baseline significantly negatively predicted child

wish at baseline in male students. Child wish at baseline was significantly positively related to child wish at follow-up in both female and male students. Quality of health at baseline significantly and positively predicted child wish at follow-up only in female students. Positive mental health at baseline, and quality of health at follow-up significantly and positively predicted child wish at follow-up only in male students. Satisfaction with life at baseline showed a negative suppression effect(54), as its zero-order correlation with child wish at follow-up was positive (r =.04, p=.03) but negatively predicted child wish at follow-up in the multiple regression model. Suppression reveals true relationship between predictors and outcome variables (55). Depression at follow-up significantly and negatively predicted child wish at follow-up in both female and male students.

In the German student sample, having a partner at baseline was positively related to child wish at baseline only in female students. Age was negatively related to child wish at baseline only in female students. Depression at baseline significantly negatively predicted child wish at baseline only in male students. Child wish at baseline was significantly positively related to child wish at follow-up in both female and male students. Stress at baseline significantly positively predicted child wish at follow-up. This is a classic suppression effect, as its zero-order correlation with child wish at follow-up was not significant (r=.06, p=.236), but the semi-partial correlation with child wish at follow-up was larger (r=.17, p>.001).

Results from model comparisons between female and male students by country are presented in Table 4a for China and Table 4b for Germany. In China, after setting the path from positive mental health at baseline to child wish at follow-up to vary freely, the Satorra-Bentler Chi^2-difference test was not significant. This means that only the path from positive mental health at baseline to child wish at follow-up was different between female and male students in China. In Germany, after setting child wish at follow-up on stress at baseline to vary freely, the Satorra-Bentler Chi^2-difference test was no longer significant. This means that

only the path from stress at baseline to child wish at follow-up was different between female and male students in Germany.

Results from model comparisons between China and German students by gender were presented in Table 5a for female and Table 5b for male students. In female students, after allowing two paths to vary freely (child wish at baseline to age at baseline, and child wish at follow-up to child wish at baseline), the Satorra-Bentler Chi^2-difference test was no longer significant. This means that these two paths were different between female students in China and Germany. In male students, after setting two paths to vary freely (child wish at follow-up to child wish at baseline, and child wish at follow-up to stress at baseline), the Satorra-Bentler Chi^2-difference test was no longer significant. This means that these two paths were found to be different between male students in China and Germany.

Discussion

The aim of the current study was to examine the relationship between child wish and mental health cross-culturally, and over time. Past research has implicated some sociodemographic (19) and motivational factors (20), but has not examined mental health specifically in relation to child wish to our knowledge. Child wish is predicted by coming from a two-parent household, having more siblings, and subscribing to Catholicism in West Germany (19). A Belgian study identified fear of loss of autonomy, fear of loss of femininity, unpredictability, and overpopulation concerns as reasons for not wanting children, and biopsychosocial integration, parenting, getting a second chance at life, relational growth, and rejuvenation as reasons for wanting children (20). In the present study on mental and somatic health factors, some interesting effects emerged for both Chinese and German students. In general, more variables predicted child wish in Chinese students. Results indicated that family affluence is more influential for Chinese students than for German students when thinking about having a child now, in that wealthier Chinese students were less likely to want to have a child than less wealthy Chinese students. Having a partner was associated with a higher child

wish in both Chinese and German female students, consistent with past research from the middle (23) and far east (25). Age showed an interesting effect on child wish of female students. That is, in China, older female students were more likely to want to have a child, while older female students in Germany were less likely to want to have a child. These results may be a reflection on more traditional versus more modern society and supports for women in these two countries.

Priorities for German women might be shifted from rearing children towards attaining occupational goals. German women may be less inclined to want to start a family right away as they progress through college, as their job prospects may be more expansive than those of Chinese women. Further, creating a nuclear family with a partner may be seen as less of a necessary condition for having children in Germany, which is generally wealthier and more socially liberal than China. Interestingly, neither of these two factors (partnership, age) can predict child wish for the next year.

Somatically healthier and happier students in China are more likely to report wanting to have a child. Somatically healthier female students in China also have a higher child wish in the following year. Reporting higher positive mental health is associated with higher child wish in Chinese male students. Higher satisfaction with life value is associated with higher child wish in Chinese female students. However, higher satisfaction with life value predicts lower child wish in the next year in Chinese male students. In sum, Chinese students generally feel more positively about having children when they are happy and healthy in general, with the exception that highly satisfied males may wish to continue the lifestyle that they are enjoying rather than adding a child to it. In line with these findings, higher depression level is associated with lower child wish in both Chinese and German male students as well as in Chinese female students. Being depressed in one's late teens and 20's is a marker for lower child wish in all but German females. It would be interesting to see if depression had the opposite effect on child wish in much older people, nearing their 40's, as at that age, it may be

that for those with no child, depression and wanting a child are much more strongly positively correlated. Surprisingly, higher stress levels predicts higher child wish in the following year in German male students. We can only guess at an explanation for this. It could be that the relationship is explained by a third factor. For example, perhaps academically-oriented German males are simultaneously more stressed, yet feel more prepared to shoulder the burdens and costs of child rearing.

This study has several strengths: It is a cross-cultural study with large numbers of participants and multiple data-collection points across time. Further it examines a topic that is not well-researched, and thus we believe the present findings make a unique contribution to the literature. The study also has several limitations. First, while the overall sample size was large, the sample of Chinese students was much larger than the sample of German students. It may be that this made smaller effects harder to detect in the German sample. Further, all data are based on self-report. Students were asked about child wish, but there was no follow-up to measure actual realization of the wish to have a child. It would be interesting and likely fruitful to identify the mental health profiles of individuals in a large population and follow them over a decade or more to determine which individuals indeed tried to have children, and gave birth to one or more or miscarried.

In conclusion, it seems that both positive and negative mental health, as well as self-perceived somatic health, have some effect on cihd wish in young adults in both Germany and China. Chinese students express more desire to have children when they are happy and healthy, with the exception of those males expressing high life satisfaction. More depressed Chinese and German male students and Chinese female students are less likely to express child wish. German students' child wishes did not appear to be strongly influenced by positive mental health, and German females' child wishes were not strongly influenced by depression. As population researchers continue to examine fertility and adoption trends across

the globe, as well as trends in mental health in developed and developing countries, we believe it is important to examine these trends together.

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Table 1

Descriptive statistics

	China (*N* = 11,133)		Germany (*N* = 1,441)	
	N	%	N	%
Fertility wish BL				
no	1261	11.3%	184	12.8%
yes	9872	88.7%	1257	87.2%
Fertility wish FU				
no	1101	9.9%	206	14.3%
yes	10032	90.1%	1235	85.7%
Gender				
female	6823	62.1%	906	62.9%
male	4167	37.9%	535	36.1%
Partner BL				
no	9404	84.5%	640	44.4%
yes	1722	15.5%	801	55.6%
	Mean	SD	Mean	SD
Baseline				
Age_BL	19.597	1.580	23.375	4.095
FASII_BL	2.753	2.153	3.928	1.797
Quality of health_BL	87.201	10.962	77.380	19.410
Subjective Happiness_BL	21.754	4.229	19.276	4.962
Positive Mental Health_BL	21.213	4.934	18.415	5.730
Satisfaction with Life_BL	23.999	6.451	25.373	6.247
Stress_BL	3.316	3.097	7.280	4.692
Depression_BL	1.790	2.418	4.405	4.435
Follow-up				
Quality of health_FU	83.234	13.592	77.175	19.788
Subjective Happiness_FU	21.284	4.412	19.203	4.737
Positive Mental Health_FU	19.983	5.196	18.152	5.871
Satisfaction with Life_FU	22.817	6.610	25.337	6.167
Stress_FU	3.669	3.688	7.078	4.767
Depression_FU	2.496	3.393	4.366	4.466

Note: BL=baseline, FU= follow-up

Table 2

Correlations among measures with Germany below diagonal, China above diagonal

	Fertility wish_BL	Fertility wish_FU	Gender	Partner_BL	Age_BL	FASII_BL	Quality of health_BL	Subjective Happiness_BL	Positive Mental Health_BL	Satisfaction with Life_BL	Stress_BL	Depression_BL	Quality of health_FU	Subjective Happiness_FU	Positive Mental Health_FU	Satisfaction with Life_FU	Stress_FU	Depression_FU
Fertility wish_BL	_	.383**	.074**	.039**	.060**	-.048**	.118**	.128**	.113**	.097**	-.096**	-.125**	.069**	.081**	.085**	.065**	-.072**	-.085**
Fertility wish_FU	.729**	_	.059**	.026**	.062**	-.054**	.099**	.082**	.085**	.060**	-.073**	-.092**	.089**	.089**	.098**	.068**	-.103**	-.120**
Gender	.014	.002	_	-.021*	.042**	-.133**	.052**	-.090**	-.006	-.070**	-.024*	.020*	-.018	-.061**	-.011	-.063**	.047**	.109**
Partner_BL	.085**	.078**	-.111**	_	.147**	.082**	.006	.064**	.049**	.086**	-.017	-.034**	.027**	.055**	.063**	.079**	-.028**	-.034**
Age_BL	-.044	-.064*	.060*	.112**	_	-.143**	.01	.013	.031**	.033**	-.048**	-.027**	.037**	.026**	.039**	.033**	-.048**	-.033**
FASII_BL	.047	.067*	.040	.004	-.110**	_	-.093**	.106**	.074**	.206**	.002	-.015	-.088**	.040**	.063**	.123**	-.007	-.025**
Quality of health_BL	.109**	.112**	.026	.009	-.084**	.029	_	.332**	.367**	.230**	-.358**	-.378**	.278**	.243**	.247**	.142**	-.224**	-.204**
Subjective Happiness_BL	.186**	.147**	-.017	.171**	-.108**	.125**	.325**	_	.586**	.496**	-.400**	-.472**	.210**	.420**	.378**	.300**	-.268**	-.279**
Positive Mental Health_BL	.186**	.160**	.058*	.125**	-.095**	.158**	.421**	.789**	_	.528**	-.484**	-.534**	.206**	.334**	.435**	.293**	-.297**	-.288**
Satisfaction with Life_BL	.184**	.168**	-.008	.199**	-.136**	.170**	.330**	.659**	.728**	_	-.313**	-.364**	.128**	.276**	.341**	.361**	-.198**	-.203**
Stress_BL	-.028	-.036	-.164**	.075**	.056*	-.099**	-.329**	-.426**	-.538**	-.394**	_	.662**	-.172**	-.249**	-.308**	-.197**	.419**	.324**
Depression_BL	-.145**	-.153**	-.041	-.113**	.066*	-.106**	-.347**	-.624**	-.700**	-.608**	.601**	_	-.180**	-.279**	-.305**	-.201**	.331**	.355**
Quality of health_FU	.073**	.072**	.030	.080**	.002	.044	.400**	.298**	.355**	.295**	-.270**	-.306**	_	.317**	.339**	.215**	-.277**	-.268**
Subjective Happiness_FU	.171**	.152**	-.033	.151**	-.039	.088**	.261**	.694**	.608**	.508**	-.341**	-.467**	.365**	_	.611**	.521**	-.377**	-.377**
Positive Mental Health_FU	.163**	.165**	.032	.123**	-.078**	.117**	.333**	.620**	.683**	.565**	-.421**	-.527**	.462**	.759**	_	.574**	-.465**	-.449**
Satisfaction with Life_FU	.162**	.167**	-.061*	.174**	-.064*	.178**	.288**	.545**	.598**	.691**	-.319**	-.475**	.384**	.637**	.718**	_	-.290**	-.272**
Stress_FU	-.007	-.040	-.135**	.017	.050	-.088**	-.242**	-.340**	-.398**	-.297**	.550**	.382**	-.318**	-.438**	-.541**	-.358**	_	.800**
Depression_FU	-.053*	-.121**	.005	-.110**	.027	-.094**	-.245**	-.451**	-.486**	-.438**	.395**	.569**	-.396**	-.596**	-.678**	-.572**	.602**	_

** The correlation is significant at the level of 0.01 (2-sided)..

* The correlation is significant at the level of 0.05 (2-sided).

Table 3a

Path model coefficients in China student sample

Outcome		M1-China				M2-China	
		Female		Male			
		Betas	95%CIs	Betas	95%CIs	Betas	95%CIs
Child wish_BL	Family Affluence_BL	-.033**	[-.053,-.013]	-.036*	[-.066,-.006]	-.033***	[-.049,-.017]
	Partner_BL	.172**	[.050,.294]	.082	[-.102,.266]	.145**	[.043,.247]
	Age_BL	.068***	[.038,.098]	.027	[-.015,.069]	.054***	[.030,.078]
	Quality of health_BL	.005**	[.001,.009]	.010***	[.004,.016]	.007***	[.003,.011]
	Happiness_BL	.031***	[.017,.045]	.022*	[.004,.040]	.027***	[.017,.037]
	Postive mental health_BL	.001	[-.011,.013]	.003	[-.013,.019]	.002	[-.008,.012]
	Satisfaction with life_BL	.011**	[.003,.019]	.001	[-.009,.011]	.007*	[.001,.013]
	Stress_BL	.000	[-.018,.018]	.013	[-.015,.041]	.004	[-.010,.018]
	Depression_BL	-.014	[-.038,.010]	-.037*	[-.069,-.005]	-.022*	[-.040,-.004]
Child wish_FU	CW_BL	.658***	[.618,.698]	0.613***	[.547,.679]	.646***	[.612,.680]
	Family Affluence_BL	-.019	[-.039,.001]	0.005	[-.027,.037]	-.012	[-.028,.004]
	Partner_BL	-.032	[-.16,.096]	-0.059	[-.257,.139]	-.04	[-.148,.068]
	Age_BL	.018	[-.016,.052]	0.032	[-.010,.074]	.023	[-.003,.049]
	Quality of health_BL	.005*	[.001,.009]	-0.002	[-.008,.004]	.002	[-.002,.006]
	Happiness_BL	-.013	[-.027,.001]	-0.008	[-.026,.010]	-.012*	[-.024,.000]
	Postive mental health_BL	-.009	[-.021,.003]	0.023**	[.007,.039]	.003	[-.007,.013]
	Satisfaction with life_BL	.002	[-.006,.01]	-0.012*	[-.024,.000]	-.002	[-.008,.004]
	Stress_BL	.008	[-.010,.026]	-0.012	[-.042,.018]	.002	[-.014,.018]
	Depression_BL	-.016	[-.040,.008]	0.031	[-.001,.063]	.002	[-.018,.022]
	Quality of health_FU	.002	[-.002,.006]	0.005*	[.001,.009]	.003*	[.001,.005]
	Happiness_FU	.008	[-.006,.022]	0.005	[-.013,.023]	.007	[-.005,.019]
	Postive mental health_FU	.003	[-.009,.015]	0.004	[-.014,.022]	.003	[-.007,.013]
	Satisfaction with life_FU	.006	[-.002,.014]	0.002	[-.010,.014]	.005	[-.001,.011]
	Stress_FU	.000	[-.020,.020]	0.016	[-.012,.044]	.005	[-.011,.021]
	Dep_FU	-.040***	[-.062,-.018]	-0.049**	[-.079,-.019]	-.043***	[-.061,-.025]

Note: * p < .05; ** p < .01; *** p < .001.

Table 3b
Path model coefficients in German student sample

Outcome		M1-Germany				M2-Germany	
		Female		Male			
		Betas	95%CIs	Betas	95%CIs	Betas	95%CIs
Child wish_BL	Family Affluence_BL	-.025	[-.085,.035]	.084	[-.006,.174]	.009	[-.041,.059]
	Partner_BL	.341**	[.099,.583]	-.007	[-.345,.331]	.222*	[.026,.418]
	Age_BL	-.034**	[-.058,-.010]	.002	[-.038,.042]	-.025*	[-.045,-.005]
	Quality of health_BL	-.001	[-.007,.005]	.008	[.000,.016]	.002	[-.004,.008]
	Happiness_BL	.020	[-.024,.064]	-.013	[-.083,.057]	.011	[-.027,.049]
	Postive mental health_BL	.027	[-.013,.067]	-.005	[-.071,.061]	.018	[-.016,.052]
	Satisfaction with life_BL	-.012	[-.046,.022]	.036	[-.016,.088]	.002	[-.026,.030]
	Stress_BL	.027	[-.007,.061]	.046	[-.016,.108]	.031*	[.001,.061]
	Depression_BL	-.028	[-.068,.012]	-.062*	[-.116,-.008]	-.040*	[-.072,-.008]
Child wish_FU	CW_BL	.936***	[.902,.970]	.936***	[.888,.984]	.936***	[.908,.964]
	Family Affluence_BL	.038	[-.012,.088]	-.015	[-.089,.059]	.023	[-.019,.065]
	Partner_BL	-.086	[-.276,.104]	.029	[-.243,.301]	-.049	[-.205,.107]
	Age_BL	-.005	[-.027,.017]	-.001	[-.033,.031]	-.001	[-.019,.017]
	Quality of health_BL	.003	[-.001,.007]	.001	[-.003,.005]	.002	[-.002,.006]
	Happiness_BL	-.016	[-.052,.020]	-.021	[-.065,.023]	-.019	[-.047,.009]
	Postive mental health_BL	-.014	[-.050,.022]	.001	[-.049,.051]	-.010	[-.040,.020]
	Satisfaction with life_BL	.004	[-.022,.030]	.004	[-.038,.046]	.004	[-.018,.026]
	Stress_BL	-.023	[-.053,.007]	.062*	[.006,.118]	-.004	[-.030,.022]
	Dep_BL	.012	[-.026,.050]	-.011	[-.061,.039]	.005	[-.025,.035]
	Quality of health_FU	-.001	[-.007,.005]	-.004	[-.016,.008]	-.002	[-.008,.004]
	Happiness_FU	.030	[-.012,.072]	.000	[-.062,.062]	.021	[-.013,.055]
	Postive mental health_FU	.006	[-.032,.044]	.031	[-.023,.085]	.014	[-.016,.044]
	Satisfaction with life_FU	.030	[-.002,.062]	-.015	[-.063,.033]	.015	[-.011,.041]
	Stress_FU	.013	[-.019,.045]	-.014	[-.064,.036]	.006	[-.020,.032]
	Depression_FU	.018	[-.020,.056]	-.014	[-.062,.034]	.005	[-.025,.035]

Note: * p < .05; ** p < .01; *** p < .001.

Table 4a

Model comparisons in China student sample between female and male

	Model fit indices						Model comparison test			
	χ^2	df	χ^2(df)	CFI	RMSEA	RMSEA-CI	Comparison	scaled $\Delta\chi^2$	Δdf	p
Model 1. baseline model	24.138	12	24.138(12)	.991	.014	.005--.022				
Model 2. all paths constrained	61.525	37	61.525(37)	.982	.011	.006--.016	2 vs. 1	38.023	25	.046
Model 3. fertility wish at FU on positive mental health at BL set to vary freely	52.749	36	52.749(36)	.988	.009	.003--.015	3 vs 1	28.980	24	.221

Table 4b

Model comparisons in German student sample between female and male

	Model fit indices						Model comparison test			
	χ^2	df	χ^2(df)	CFI	RMSEA	RMSEA-CI	Comparison	scaled $\Delta\chi^2$	Δdf	p
Model 1. baseline model	14.584	12	14.584(12)	.999	.017	.000--.043				
Model 2. all paths constrained	52.002	37	52.002(37)	.995	.023	.000--.037	2 vs. 1	38.528	25	.041
Model 3. fertility wish at FU on stress at BL set to vary freely	45.707	36	45.707(36)	.997	.019	.000--.034	3 vs 1	31.984	24	.127

Table 5a

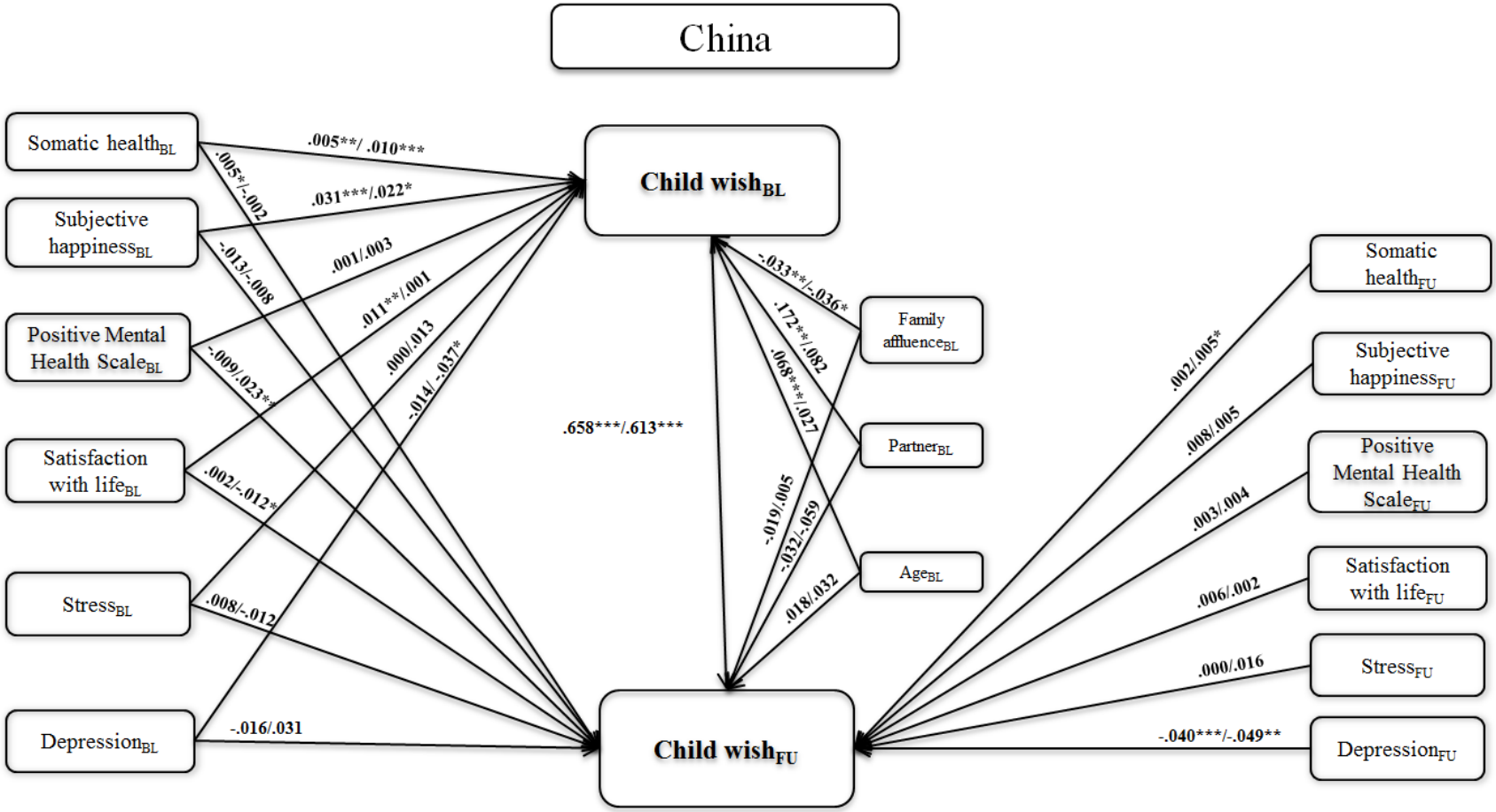
Model comparisons in female students between China and Germany

	Model fit indices						Model comparison test			
	χ^2	df	χ^2(df)	CFI	RMSEA	RMSEA-CI	Comparison	scaled $\Delta\chi^2$	Δdf	p
Model 1. baseline model	31.840	12	31.840(12)	.994	.021	.012--.030				
Model 2. all paths constrained	182.129	37	182.129(37)	.958	.032	.028--.037	2 vs. 1	159.218	25	<.001
Model 3. fertility wish at BL on age at BL, fertility wish at FU on fertility wish at BL set to vary freely	59.803	35	59.803(35)	.993	.014	.007--.020	3 vs 1	31.184	23	.118

Table 5b

Model comparisons in male students between China and Germany

	Model fit indices						Model comparison test		
	χ^2	df	χ^2(df)	CFI	RMSEA	RMSEA-CI	Comparison	scaled $\Delta\chi^2$	Δdf	p
Model 1. baseline model	7.107	12	7.107(12)	1	0.000	0.000--.012				
Model 2. all paths constrained	96.020	37	96.020(37)	.960	.027	.020--.033	2 vs. 1	91.376	25	<.001
Model 3. fertility wish at FU on fertility wish at BL and stress at BL set to vary freely	39.974	35	39.974(35)	.997	.008	.000--.018	3 vs 1	32.628	23	.088



BL: Baseline (t_1); FU: Follow-up (t_2)
Coefficient: female/male

Figure 1
Path model with Chinese student sample

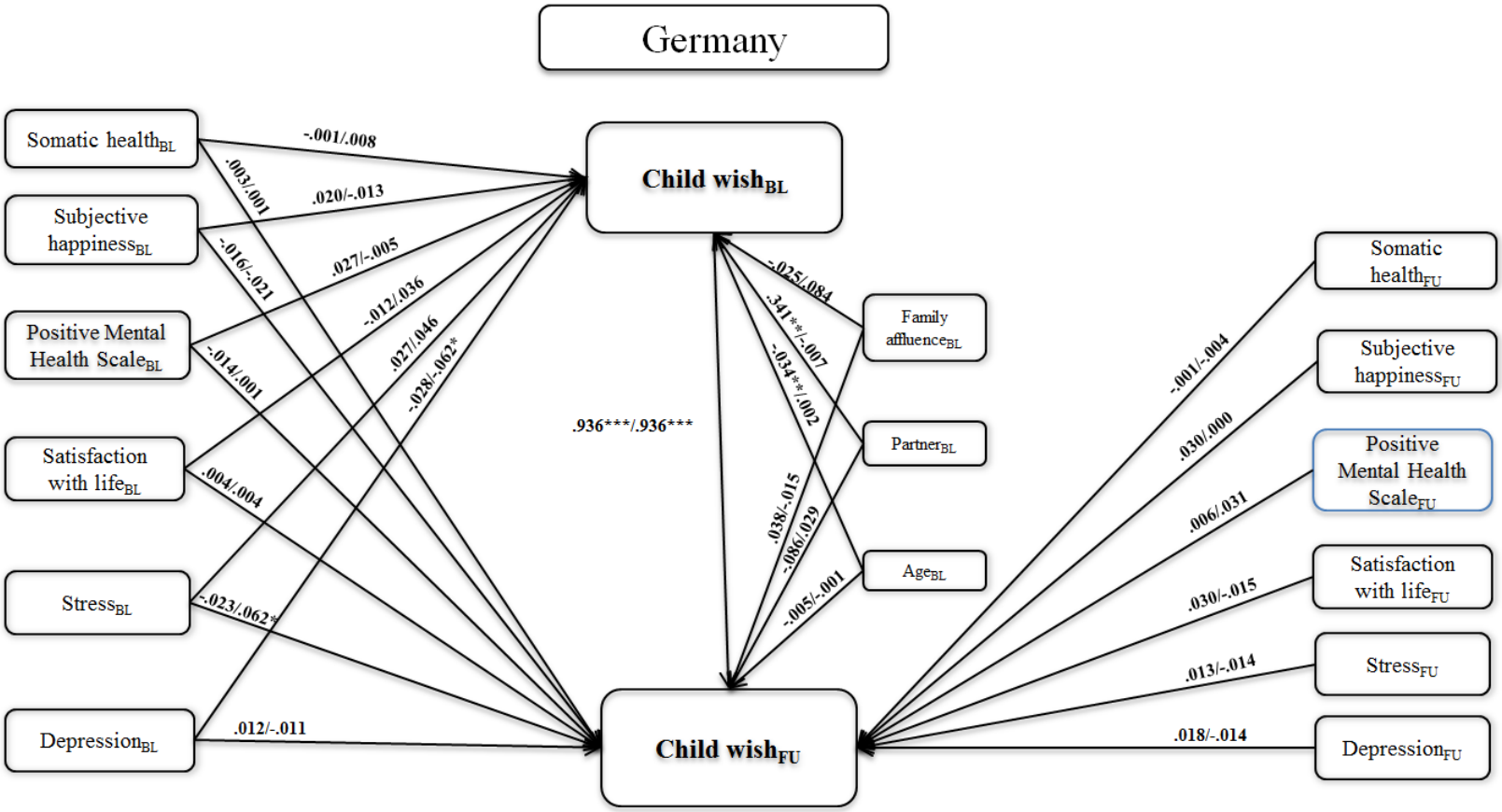


Figure 2
Path model with German student sample

Appendix A

Measurement invariance tests for DASS-21 between Germany and China students

	Model fit indices						Model comparison test				
	χ^2	df	χ^2(df)	CFI	RMSEA	SRMR	Comparison	scaled $\Delta\chi^2$	Δdf	p	ΔCFI
Stress											
China	422,229	14	422,229(14)	.985	.049	.030					
Germany	256,915	14	256,915(14)	.981	.096	.038					
Model 1. Configural invariance	690,846	28	690,846(28)	.983	.058	.032					
Model 2. Full metric invariance	809,952	34	809,952(34)	.980	.057	.037	2 vs. 1	119,106	6	<.001	.003
Model 3. Full Scalar invariance	1812,145	47	1812,145(47)	.956	.074	.040	3 vs. 2	1002,193	13	<.001	.024
Anxiety											
China	402,64	14	402,64(14)	.984	.048	.035					
Germany	152,534	14	152,534(14)	.978	.072	.040					
Model 1. Configural invariance	568,659	28	568,659(28)	.982	.053	.035					
Model 2. Full metric invariance	491,449	34	491,449(34)	.985	.044	.037	2 vs. 1	-77,21	6	<.001	.003
Model 3. Full Scalar invariance	1099,379	47	1099,379(47)	.964	.057	.037	3 vs. 2	607,93	13	<.001	.021
Depression											
China	301,874	14	301,874(14)	.990	.041	.030					
Germany	124,274	14	124,274(14)	.995	.064	.022					
Model 1. Configural invariance	445,553	28	445,553(28)	.991	.046	.029					
Model 2. Full metric invariance	500,876	34	500,876(34)	.990	.045	.032	2 vs. 1	55,323	6	<.001	.001
Model 3. Full Scalar invariance	1132,831	47	1132,831(47)	.977	.058	.036	3 vs. 2	631,955	13	<.001	.013

Note: The rule of ΔCFI not greater than 0.01 (56) is recommended.